UECM1404 Theory of Interest Tutorial 1

TUTORIAL 4

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Q1. An-annuity-immediate pays 16 at the end of years 1 and 2, 15 at the ends of years 3 and 4, etc.., with payments decreasing by 1 every second year, until nothing is paid. The effective annual rate of interest is 6%. Calculate the present value of this annuity-immediate.

152.7

Q2. Olga buys a 2-year increasing annuity for X. Olga will receive 90 at the end of the first month, 108 at the end of the second month, and for each month thereafter the payment increase by 18. The nominal interest rate is 4% convertible quarterly. Calculate X.

6,774.44

Q3. Jenny receives 19-year increasing annuity-immediate paying 800 the first year and increasing by 800 each year thereafter. Matt receives a 19-year decreasing annuity-immediate paying Y the first year and decreasing by $\frac{Y}{19}$ each year thereafter. At an effective annual interest rate of 9%, both annuities have the same present value. Calculate Y.

9,165.96

Q4. James purchased a perpetuity today for 13,000. He will receive the first annual payment of 300 five year from now. The second annual payment will be 300 plus an amount B. Ecah subsequent payment will be the prior payment plus an additional constant amount B. If the effective annual interest rate is 7%, find B.

62.4977

Q5. Bob purchases an increasing perpetuity with payments occuring at the end of every 2 years. The first payment is 1, the second one is 2, the third one is 3, etc. The price of the perpetuity is 120. Calculate the annual effective interest rate.

0.0467

Q6. An annuity provides for 38 annual payments. The first payment of 120 is made immediately and the remainning payments increase by 9% per annum. Interest is calculated at 12.8% per annum. Calculate the present value of this annuity.

2,593.45

This tutorial consists of 10 questions on 2 printed pages

Q7. Justin buys a perpetuity-immediate with varying annual payments. During the first 5 years, the payment is constant and equal 14. Beginning in year 6, then payment start to increase. For year 6 and all future years, the current years's payment is $k\%$ larger than the previous year's payment. At annual effective interest rate of 8.7%, the perpetuity has a present value of 1478.21. Calculate k.

$\boxed{0.08}$

Q8. A perpetuity-immediate pays 180 per year. Immediately after the fifth payment, the perpetuity is exchanged for a 25-year annuity-immediate that will pay X at the end of the first year. Each subsequent annual payment will be 6% greater than the preceeding payment. Immediately after the 10-th payment of the 25-year annuity, the annuity will be exchanged for a perpetuity-immediate paying Y per year, the annual effective rate of interest is 6%. Calculate Y.

$\boxed{193.41}$

Q9. Stan elects to received his retirement benefit over 20 years at the rate of 3,900 per month beginning one month from now. The monthly benefit increases by 1% each year. At a nominal interest rate of 6% convertible monthly, calculate the present value of the retirement benefit.

$\boxed{587{,}778.8}$

Q10. You are given:

- The force of interest at time t is $1200t^3$.

- R is the present value of of a 8 year continuously increasing annuity which has a rate of payment of $1800t^3$ at time t.

Calculate R.

$\boxed{1.5}$